Application Number: 10/821,769
Amendment Dated: August 14, 2006
Reply to Office Action Dated: February 13, 2006

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LISTING OF THE CLAIMS

1. (currently amended) A fiber-reinforced composite spring comprising:

a spring wire comprising:

a core that includes a plurality of fiber tows; and

an outer layer of resin that is substantially devoid of the fiber tows, wherein the combination of the resin outer layer and the core has a constant thickness and cross-sectional shape, and is generally uniform and free of any surface irregularities, thereby yielding a spring that has a predictable rate of deformation when subjected to a compressive load.

2. (original) The spring of claim 1, wherein the core is disposed within the spring wire at a generally central location.

3. (cancelled)

4. (previously presented) The spring of claim 1, wherein the spring has a generally circular cross-sectional shape.

5. (original) The spring of claim 4, wherein the core is generally concentric with the generally uniform outer surface such that the core is located at a substantially constant radial distance from the generally uniform outer surface for a cross-section of the spring wire taken at a point along the longitudinal axis.

6. (cancelled)

7. (previously presented) The spring of claim 1, wherein the core has a rectangular-cross sectional shape and the core has a the central axis that is generally coaxial with a central axis of the spring wire such that the central axis of the core is located at an approximately equal radial distance from opposing planar surfaces of the generally uniform outer surface of the rectangular-shaped core.

8. (previously presented) The spring of claim 1, wherein the fiber tows are natural fibers selected from the group consisting of jute and rayon fibers.

9. (previously presented) The spring of claim 1, wherein the fiber tows are synthetic fibers selected from the group consisting of glass, carbon, boron, boron, silicon carbide, aluminum oxide, quartz, alumina-silica, alumina-boria-silica, zerconia-silica, and fused silica fibers.

10. (previously presented) The spring of claim 1, wherein the resin is a thermoplastic resin.

11. (previously presented) The spring of claim 1, wherein the resin is a thermosetting resin selected from the group consisting of epoxy, bis-maleimide, polyimide, polyester, vinyl ester resins, polyether, ether ketone, polyphenylene sulfide, polyetherimide, and polyamide imide resins.

12. (currently amended) A fiber-reinforced composite spring formed by a process comprising the steps of:

impregnating a plurality of fiber tows with a resin to form a core;

encasing at least a portion of the core within a cavity having desired interior dimensions;

forming an outer resin layer on the core by removing a portion of the resin from the impregnated fiber tows by twisting the core within the cavity to form a spring wire, where the combination of the resin outer layer and the core has a constant thickness and cross-sectional shape, and is generally uniform and free of any surface irregularities, and whereby the spring has a predictable rate of deformation when subjected to a compressive load; and

shaping the spring wire to form a spring.

13. (previously presented) The spring of claim 12, wherein the step of encasing at least a portion of the core within the cavity comprises the steps of:

providing a generally planar sheet of flexible shroud material;

placing the core in contact with the sheet of shroud material;

wrapping the sheet of shroud material around the core; and

securing a first portion of the sheet of shroud material to a second portion of the sheet of shroud material to form the cavity around the core.

14. (previously amended) The spring of claim 12, wherein the step of impregnating the plurality of fiber tows with the resin comprises the step of:

impregnating the plurality of fiber tows with a thermoplastic resin.

15. (previously presented) The spring of claim 14, wherein the step of encasing at least a portion of the core within the cavity comprises the steps of:

at least partially solidifying the thermoplastic resin to minimize smearing of the resin while encasing the core;

inserting the core and the at least partially solidified thermoplastic resin into the cavity; and

exposing the thermoplastic resin within the cavity to a suitable source of energy for liquefying the at least partially solidified thermoplastic resin within the cavity.

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16. (previously presented) The spring of claim 15, wherein the cavity is an interior passage defined by a shroud of flexible material that is to encase the spring wire.

17. (previously presented) The spring of claim 12, wherein the process further comprises the steps of:

at least partially solidifying the resin in the spring shape within the cavity; and

removing the spring wire from the cavity.

18. (previously presented) The spring of claim 17, wherein the resin is a thermosetting resin.

19. (previously presented) The spring of claim 18, wherein the step of at least partially solidifying the resin within the cavity includes the steps of:

wrapping the spring wire around a mandrel; and

at least initiating crosslinking of the thermosetting resin.

20. (previously presented) The spring of claim 12, wherein the step of shaping the spring wire to form the spring comprises wrapping the spring wire encased within the cavity around a mandrel.

Claims 21 through 30, cancelled.